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of this study except images? Describe the battle of Bunker Hill. What images do you recall? If you cannot recall images of events in history, what have you as a mental result of your study?

7. Geography. Please carefully recall some products of your study of geography? If geography is a description of the earth's surface, what have you now as recollections of this study? What other images have you of the earth's surface, and what have you now as recollections of this study? What other images have you of the earth's surface, gained by the study of geography? How many of you can image words alone from your study of geography? What is the difference between the images of a word and an image of a portion of the earth's surface? for instance, the image of North America, and the image of the word North America? When I write upon the board the name Greece, what does this name recall to you? Describe Greece. What is the use of a map? If you recall nothing but maps, what have you gained from the study of geography? Recall all the land-

scapes that you have ever seen, and those which you gained in the study of geography.

8. Comparisons between School Life and Life outside of the School. Consider questions very carefully. In which have you gained the greater number of images, in school or outside of school? Which images are more distinct, those gained in school or those gained outside of school? Which images have closer relations, those in school or those outside of school? Which images do you use more in expression, those gained in school or those gained outside of school? What is the difference between reading and study of text? In which process did you acquire the clearer images? Is it possible for you to sum up all you have ever learned in images? What have you remaining of study except images?

9. General questions. How did you gain these images on your vacation? Every time you see, do you have an image? Every time you hear, do you have an image? Every time you touch, do you have an image?

(To be continued.)

## Department of Science

Wilbur S. Jackman      Ira B. Meyers      Charles W. Carmen

The course in nature study will include two lines of work: first, practical instruction in the subject-matter of science; second, the development, illustration, and discussion of methods of teaching the elements of natural science in elementary and secondary schools.

To this end a small area embracing an interesting and varied landscape near Winnetka has been selected for special observation and study. This has been done with a view to training the student in the methods pursued by the best schools in conducting field-work, and for the purpose of indicating how an area may be interpreted. The students selecting this course will be divided into groups of not more than thirty members each, and, in charge of teachers, will visit the field as often as

may be necessary to obtain the proper data and materials for laboratory work.

The presentation of what the area affords will be from the standpoint of the landscape taken as an organism. Under this conception, every part observed will be considered in its qualitative and quantitative relations to the other parts and to the whole. The study will begin with a consideration of the organization and distribution of life as exhibited by the plants and animals, and will include an investigation of the causes that underlie present appearances. Therefore an examination will be made of the character of the soil, the amount and distribution of light and heat, and the circulation of the water.

The materials which the area produces will be treated in accordance with labora-

tory methods from the point of view of their function in the organization of the landscape.

The work of the plant, for example, is partly physical and partly chemical, and depends upon both the physical and chemical properties of the soil. It also bears similar relations to the sunshine. In a general way the same may be said to be true of the animal forms. Again, the soil acts as both a physical and chemical agent in its relations to the plants and animals. The methods of the several branches of science, biology, physics, chemistry, astronomy, meteorology, mineralogy, etc., will be used, therefore, as they seem to be needed in the proper interpretation of the natural history of the area.

The students will be expected to devote at least two hours per week to this part of

the work, which will be arranged for on the afternoon program. For this purpose they will meet Professors Carman, I. B. Meyers, and Bass, according to the groups in which they may be placed. The general character of the work is indicated in the different syllabi that follow in this connection.

In the course on *Pedagogics of Nature Study* it is the purpose to present the philosophy of school-teaching in accordance with the demands of science work. This will be done by means of the lecture and round-table method, one hour each day in the forenoon program. All those who select this work are expected to take at least two hours' laboratory work per week in the afternoon.

The topics selected for discussion are included in the following outline.

## Pedagogics of Nature Study

Wilbur S. Jackman

### OBSERVATION

**Conditions.** 1. (a) Physiology—the senses (b) physical. 2. The function of observation in imaging; 3. Relation of observation to inference; to the imagination: 4. Place and scope in education.

References: *Relation of Arithmetic to Elementary Science, Educational Review*, January, 1893. *Nature Study for the Common Schools*, Jackman (Introduction).

**Nature Pictures.** 1. Sources; 2. Means by which they are created in the mind; 3. Nature pictures as a basis for the various so-called school studies; 4. The inter-relations of nature pictures in time and space.

References: *Nature Study and Related Subjects*, Jackman, Part I. *Nature Study for the Common Schools*, Jackman (Introduction).

**Expression.** 1. The function of expression in imaging; 2. The relation of expression to observation; 3. Use and limitations of painting and drawing; 4. Appropriate subject-matter for painting and drawing and its technical treatment.

References: *Representative Expression in Nature Study, Educational Review*, October, 1895. *Nature Study and Related Subjects*, Part I. *Nature Study for the Common Schools*, Jackman (Introduction).

**Expression (Continued).** 1. Writing, its function and place; 2. Writing, technical treatment; 3. Making, its function and technical treatment; 4. Modeling, its function and technical treatment.

References: *Nature Study and Related Subjects*, Jackman, Part I. *Nature Study for the Common Schools*, Jackman (Introduction).

**Measurements.** 1. The function of measurement in imaging; 2. The significance of form and proportion; 3. The origin and inter-relation of arithmetical processes; 4. The sources of subject-matter in arithmetic. The use and abuse of symbols.

References: *Relation of Arithmetic to Elementary Science, Educational Review*, January, 1893. *Nature Study and Related Subjects*, Jackman, Part I.